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APRIL 1982 NUMBER 164

Monthly Report on the Uranium Market

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MONTHLY REPORT ON THE URANIUM MARKET

April 1982 No. 164

R. WESLEY MILLER, *EDITOR*

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FOREWORD

We are pleased to announce that Scott Hickman has moved to Nuexco's New York office, where he will be associated with Jim Vaughan and Katie Bowen in brokerage activities.

In the past, it has been Nuexco's policy to release the Exchange Value *no earlier than* 8:00 AM California time on the first business day of each month. As a consequence of the opening of our New York office, Nuexco will henceforth release the Exchange Value beginning at 9:00 AM *New York* time.

MARKET ACTIVITIES

PRICING

The **Exchange Value** as of March 31, 1982 is $22.50 per pound U_3O_8, down $0.50 from last month.

This price decline is attributable to two factors. First, aggressive new sellers have appeared in the market, offering large quantities of material for near-term delivery. The ratio of near-term supply to near-term demand increased from 3.3:1 last month to 5.2:1 this month. Secondly, in the face of this increased supply, sellers demonstrated their willingness to cut prices to conclude transactions.

In an effort to describe the current market situation in a more meaningful fashion, the listings of uranium and conversion supply and demand appearing in the *Market Data* section have been revised to differentiate between active and inactive situations. The principal determinant in each case is price. Active sellers are those prepared to sell at or about current market levels. Inactive sellers are those with material available for sale, but who are unwilling to sell at current price levels. Similar distinctions are applicable to buyers, lenders and borrowers. This approach is designed to provide a measure of the active market, while also providing a measure of total market size.

The **Transaction Value** as of March 31, 1982 is $23.40 per pound U_3O_8 down $0.30 from February. March's Transaction Value includes 12 transactions totaling 2.8 million pounds U_3O_8 and covers a period of three months.

There are six uranium sales transactions and one conversion transaction reported this month:

1. A US entity sold 50 thousand to 100 thousand pounds U_3O_8 to a European buyer for delivery in the first half of 1982.
2. A US producer sold less than 50 thousand pounds U_3O_8 to a US entity for immediate delivery.
3. A US producer sold 101 thousand to 300 thousand pounds U_3O_8 to a US producer for immediate delivery. (This is the rumored transaction noted last month.)
4. A US producer sold 50 thousand to 100 thousand pounds U_3O_8 to a US utility for immediate delivery.
5. A US producer sold 301 thousand to 600 thousand pounds U_3O_8 to a US producer for delivery in the second quarter.
6. A US utility sold 101 thousand to 300 thousand pounds U_3O_8 to a European buyer.

The **Conversion Value** as of March 31, 1982 is $1.20 per pound U as UF_6, unchanged from last month. One transaction is reported this month and a second is under negotiation. It appears that substantial additional conversion will soon become available in the secondary market as a consequence of the entry of new UF_6 sellers in the uranium market.

In a secondary conversion market transaction, a US utility sold between 301 thousand and 600 thousand pounds U as UF_6 to a European buyer for delivery during early 1983.

The **Loan Use Charge Rate** remained at six percent.

AFRICA

Niger's two uranium facilities, Arlit and Akouta, produce a total of about 10.5 million pounds U_3O_8 annually. France receives about 45 percent of this total through Cogema's equity ownerships in the two projects and via the uranium allocated to other French shareholders. Somair's (Arlit) ownership is divided as follows:

Onarem (Niger)	33.00%
Cogema (French)	26.96%
CFM (French)	19.38%
Minatome (French)	7.58%
Urangesellschaft (German)	6.54%
AGIP (Italian)	6.54%
Total:	100.00%

Cominak's (Akouta) ownership is divided:

Onarem (Niger)	31.00%
Cogema (French)	34.00%
Ourd (Japanese)	25.00%
Enusa (Spanish)	10.00%
Total:	100.00%

The Japanese, German, Italian and Spanish shareholders have historically taken their pro-rata shares of production.

Onarem, Niger's state uranium entity, controls about one third of the country's production. In earlier years, all or most of that production was taken up by French interests. More recently, both as a consequence of declining prices and a desire to demonstrate a degree of independence from France, Onarem has increasingly pursued its own marketing efforts. Sales by Onarem to a number of different buyers have been made.

Most notably, more than five million pounds U_3O_8 have reportedly been sold to Libya over the past four years — some three million pounds in the first half of 1981 alone. Speculation about the reasons for the

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Libyan purchases has been widespread. French journalistic sources note three possibilities:

1. Purchases on behalf of a third party (Pakistan or Iraq) for the manufacture of an Islamic bomb.
2. Purchases on behalf of the USSR in payment for arms deliveries.
3. Purchases for a strategic stockpile in anticipation of the day when Libya will have its own nuclear industry.

Such sales to Libya must be considered as an unusual short-term opportunity for Onarem to obtain premium prices for its uranium. However, even in the longer term, political realities suggest that Niger's uranium may not be exposed to the full impact of world market forces, assuming that annual negotiations produce acceptable prices and the French or other Niger shareholders have the need and willingness to purchase unsold Onarem production.

In an unusual break with normal practice, a uranium producer in the **Republic of South Africa** publicly identified its foreign customer. Specifically, the South African press reported that Japanese customers had committed to take a significant proportion of Beisa Mines' uranium production. Earlier reports had indicated only that development of the mine was financed by a consumer loan and a long-term uranium contract arranged in the late 1970s. The deliveries, covering about 80 percent of planned production, are scheduled to begin in 1983. Earlier production will be stockpiled.

South Africa has long-standing policies (and legislation) precluding the publication of commercial uranium information. Thus, the decision to identify a uranium buyer in this instance must be viewed as serving a specific end. Absent other information, it can only be assumed that the intent is to reassure existing and potential customers that they may continue to have confidence in South Africa as a reliable long-term uranium supplier.

Last year the assets and mining rights of Beisa, a company administered by General Mining Union Corporation (Gencor), were acquired by St. Helena Gold Mines (also a Gencor company). The transaction involved the use of St. Helena's tax shield, which enabled the Beisa Mines' capital expenditures to be deducted from St. Helena's taxable income. Production began in December of last year and the mine is scheduled to reach full capacity by mid-1982. Based on published grade, capacity and recovery factors, Beisa's production could exceed 1,700,000 pounds U_3O_8 annually.

Of particular significance is the fact that Beisa is the first South African development where uranium was visualized as the primary product and gold the by-product. The economic viability of the operation will depend, of course, on two factors -- the price terms of the long-term uranium contract (which are not known) and the price of gold (which has fallen to less than $350 per ounce from its 1980 high of $850).

As if to emphasize the above comments, Palabora Mining Company's (PMC) just-issued 1981 annual report noted that PMC concluded a contract for delivery of a substantial quantity of uranium to a new customer during the first quarter of 1982. PMC produced 525,000 pounds U_3O_8 during 1981, an increase of 36 percent over its 1980 production of 383,000 pounds. PMC's uranium production is a by-product of its copper operations, and the increased output, which is expected to continue, is attributable to improved metallurgical recovery.

AUSTRALIA

Sales initiatives from representatives of two large Australian uranium projects have begun or will begin shortly. Plans are being made to offer additional tonnage from Energy Resources of Australia (ERA)'s Ranger facility. Vying for the limited international demand will be production from the Jabiluka project, which recently passed the last approval hurdle required for market entry.

The conservative design of the Ranger plant allows ERA, only six months after start-up, to produce at a rate of 20 percent above its nominal capacity of 3,300 tonnes U_3O_8 per year. After some minor modifications to the plant, ERA will soon be able to exceed the nominal production rate by 50 percent.

The development of Australia's largest uranium deposits, Jabiluka, took two major steps forward during the past month. An agreement between the Northern Land Council (NLC) and Pancontinental Mining Ltd., the project operator, was initialled on February 27, 1982 after 13 months of negotiations. Pancontinental owns 65 percent of Jabiluka; the remainder is owned by Getty Oil Co. This agreement with the NLC on behalf of the Aboriginal owners was the last requirement the mining company had to meet in order to satisfy government environmental conditions. The document now goes before the Aboriginal people for ratification. Details of the agreement have not been disclosed but present

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indications are that the partners will be required to make a substantial advance payment in addition to a royalty rate of not less than 2.5 percent on sales. The advance payment is made upon receipt of the last lease before production, thus, not before the project is committed to proceed. Royalties will flow to the Aboriginal Trust Fund.

The second significant step forward was the March 17 announcement of government approval of the project. Coming just three weeks after the NLC agreement, the swiftness of the approval was surprising and can be largely attributed to lobbying by the NLC. The NLC has recently taken an increasingly favorable attitude towards the project's development and had requested the government to expedite the final approval of the project, which is essential for market entry.

Within the guidelines set by the Australian government, Pancontinental and Getty are now free to negotiate contracts for the sale of Jabiluka uranium. Market testing is underway by representatives of the joint venture. Government guidelines require the seller to submit for approval the specific customers, tonnage and schedule prior to the commencement of negotiations. The ministry then specifies the terms of sale. The sales contracts must contain a pricing mechanism which provides for a floor price and a cost-related escalation formula.

Jabiluka is the sixth Australian project to have received government approval. Its proposed production capacity is to be 4,500 tonnes U_3O_8 per year. A substantial portion will have to be committed under long-term sales contracts to justify the construction of this A$600-700 million project, a daunting challenge in the present market.

The joint venture partners in the Olympic Dam copper-gold uranium deposit, Western Mining (51 percent) and British Petroleum (49 percent), signed an indenture agreement with the South Australian government early this month. This type of agreement represents an obligation on the part of the partners to continue property development in exchange for a mining lease for the minerals in the ground and a government contribution to the infrastructure costs. Specifically, the agreement commits the partners to an ongoing development program of A$50 million before 1984, and provides for a two-tier royalty system. The basic royalty is 2.5 percent on ex-mine value of production, rising to 3.5 percent after five years. In addition, the partners are required to pay a "surplus-related royalty" of up to 15 percent on the "surplus return" on shareholders' funds after tax and after a threshold return.

The indenture is based on copper production of up to 150,000 tonnes per year. No details on the proposed uranium production are given, but at maximum copper production, the amount could be between 4,000 and 5,000 tonnes U_3O_8 per year.

The state will be required to make a variety of infrastructure services available to the project in return for royalties. Although an upper limit on the state's outlay has not been set, it is not likely to exceed A$50 million.

The project partners have already spent $50 million on Olympic Dam and do not plan to proceed with further expenditures without the security of an indenture agreement approved by Parliament. Neither the state's Labor Party nor the lone Australian Democrat who holds the balance of power in the Upper House have signaled a change in their opposition to such an agreement. Thus, the scene is set for a major political battle. Protracted opposition could force a state election in which the Olympic Dam project would be the central issue.

CANADA

Exploration for uranium in Canada peaked in 1979 and has been declining over the past two years. Present indications are that exploration, as measured by total dollars expended, may fall rapidly in 1982. Government statistics for 1980, the latest reported year, show a modest decline from $129.5 million in 1979 to $128.0 million in 1980. However, in 1980, more than one-third of the total was accounted for by oil companies or their affiliates, many of which were less active or altogether absent in 1981. Federal and provincial government corporations accounted for 13 percent of the total.

The ten most active organizations in 1980, accounting for 56 percent of the $128 million total, were: Amok Ltd.; Asamera Inc.; Canadian Occidental Petroleum Ltd.; E&B Exploration Ltd.; Eldorado Nuclear Limited; Gulf Minerals Canada Limited; Pan Ocean Oil Ltd.; Saskatchewan Mining & Development Corporation; Uranerz Exploration and Mining Limited; and Urangesellschaft Canada Limited.

Of these, E&B Exploration totally abandoned exploration for uranium in 1981 and Pan Ocean remained active through joint ventures, abandoning its formerly aggressive role in the Northwest Territories.

A continuing trend away from uranium exploration is

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clear on examining publicly announced programs for 1982:

1. SMDC is diversifying its efforts into base and precious metals. Of 55 projects, 17 will be directed to uranium in Saskatchewan, 13 will be directed to base and precious metals in Saskatchewan and 25 will be directed toward base and precious metals outside the province. Uranium will not be sought outside of Saskatchewan.

2. Eldorado will remain active in uranium exploration, but is directing increasing effort to base and precious metals.

3. Brinco will defer exploration for uranium in Saskatchewan and Labrador, except for a continuing joint venture with Edison Development Canada in Eastern Labrador.

4. Canadian Occidental is concentrating heavily on coal, oil and gas; uranium is notably absent from its announced exploration plans.

5. Shell Canada has discontinued all mineral exploration activity.

6. Esso Minerals Canada is clearly directing its efforts to other metals with notable slowdown in developments at Midwest Lake and in exploration programs with others.

7. Denison is concentrating expenditures in exploration for oil and gas, particularly in foreign off-shore locations. Exploration for minerals, including uranium, will continue, but with significantly reduced efforts.

In a separate development, a press release accompanying the release of SMDC's annual report states that SMDC has made long-term sales commitments for about half of their six million pound share of Key Lake's annual production capacity. Commitments are reportedly in place with utilities in Japan, South Korea, West Germany, France and Finland, and they are negotiating contracts with utilities in Western Europe, the United States and Canada. It is Nuexco's understanding that many of the commitments have not yet been submitted to the Canadian Government for approval, although some have been. Based upon the press release and the marketing success of all the Key Lake partners, it can be inferred that Key Lake is now base loaded until approximately 1990.

EUROPE

Iberduero, the largest utility in **Spain**, has reached agreement with the autonomous Basque local government and the Spanish central government on the control and operation of the two-unit Lemoniz nuclear power plant. The Basque government will assume responsibility for the plant's operations and safety, while the utility will retain ownership and financial control.

All technical work on the two 930 MWe units was stopped in February 1981 when the Chief Engineer was assassinated by ETA (the Basque separatist organization). ETA has caused almost 25 million dollars worth of damage during its campaign of violence against Iberduero's installations in the Basque country.

Since Iberduero could do nothing about security in the Basque country, it stopped work on the plants. The Basque government stated that it was only prepared to accept responsibility if it obtained full control to operate the plants and monitor their safety. The government in Madrid would not allow a referendum and was unwilling to accept the Basque government's demands. Furthermore, since 80 percent of Spain's electricity production and distribution is in the private sector, it wanted to avoid any action which might look like nationalization.

The agreed solution calls for Iberduero to retain financial control of Lemoniz with the plants remaining part of the company's fixed assets. The utility company will pay a fee to the Basque government to run the plant. The latter will form an operating company which will probably consist of existing Iberduero staff. The responsibility for safety will be subordinated to control by the National Nuclear Energy Regulatory Commission. The first plant is not expected to begin trials until early next year.

Finland's two utilities, Teollisuuden Voima Oy (TVO) and Imatran Voima Oy (IVO), have undertaken a joint study to consider the joint development of a new 1000 MWe nuclear unit project. The plant, if approved, could be in operation by the early 1990s. No decision on the type of reactor has yet been reached. However, IVO has received offers from the USSR for a 1000 MWe WWER type PWR and for a similar sized unit from a French supplier.

IVO has two 440 MWe PWR (USSR type) in operation at Loviisa. TVO has two 600 MWe BWR (ASEA-ATOM type) in operation at Olkiluoto.

In **Hungary**, the first block of the nuclear plants at Paks are scheduled to go into operation in the second half of 1982. Type is the WWER-440 MWe PWR. Three more identical units are under construction at the same site. Plans call for eventually building a number of 1000 MWe nuclear units at the same site.

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MARKET ACTIVITIES

On March 1 in Warsaw, **Poland**, a report was published to the effect that the green light was given for Poland's first nuclear power plant. It is planned to be located in the area of Zarnowiec near Danzig. The type is to be the USSR-WWER, size 440 MWe. Four units are planned and the first is scheduled to begin operations by 1988 or 1989.

However, the president of the Polish Parliament Subcommission for Energy has taken the opposite view, saying the units are not needed. Also, the newspapers have said the plants are too expensive and dangerous and, thus, they should not be built. The pro-nuclear side has stated that when in operation the nuclear units will save Poland about 3 million tons of coal (referred to as Poland's black gold) per year, which can be exported. Given the widespread disagreement on the merits of the project, it is likely that a lengthy debate will precede the start of construction, if the units are built at all.

In the **Soviet Union**, according to Pravda, construction has been started for the nuclear plant Nabereschnye Tschelny, which is located in the Tatarischen ASSR area. The unit will be on the 1000 MWe WWER type PWR. Plans call for four such units to be built at this station eventually.

Just east of the border to Baschkirien, in the middle of the Ural area, another six nuclear units of the same size and type are planned. There was no mention that actual construction has been started on any of these.

FAR EAST

Japan's current nuclear picture is as follows:

15,676 MWe (23 units) in commercial operation
10,110 MWe (11 units) under construction
6,385 MWe (7 units) planned

Two of the units under construction, Fukushima II-1 (1100 MWe BWR) and Ikata-2 (566 MWe PWR), are scheduled to enter commercial operation before mid-year 1982. All the other units under construction are scheduled for startup by March 1986.

The planned units are those authorized by the Electric Power Resources Development Coordination Council (EPRDCC). Scheduled operation dates range from March 1986 to October 1989. An additional 5 units representing more than 4,000 MWe will probably be authorized by EPRDCC during its 1983 fiscal year (April 1, 1982 — March 30, 1983). Presumably these 5 units will all be operating by the early 1990s, at which time Japanese uranium consumption would be about 14,000,000 U_3O_8 annually.

Japanese utilities have completed negotiations with two of their major suppliers with respect to 1983 delivery prices. The agreed upon prices, $35.40 and $35.45 per pound U_3O_8, are lower than the $37.00-$38.50 range negotiated in 1981 for 1982 deliveries. Furthermore, they are substantially below the $45.00 prices negotiated in 1980 for 1981 deliveries. This price erosion is not surprising in light of the improved negotiating posture of buyers in a market characterized by oversupply and the consequent sharp drop in spot prices.

SOUTH AMERICA

Brazil's first power reactor, Angra-1, went critical during March. The reactor is roughly five years behind original schedule, as is the entire Brazilian national program.

Graduated low-power testing up to thirty percent power is the next step toward commercial operations. The granting of further licenses will depend on the results of Westinghouse efforts to resolve problems with a steam generator.

UNITED STATES

Gulf Oil has restated it plans to keep its Mt. Taylor uranium mine in production and explains its recent purchase of 1 million pounds U_3O_8 as an "inventory adjustment." Gulf has been having trouble getting its Canadian production into the United States where the producer has supply commitments to fulfill.

Washington Public Power Supply System (WPPSS) continues to have financial problems. The controlled termination of units 4 and 5 has not settled the utility's cash problem and plans to defer or "mothball" two of the remaining three units are being developed. Any decision will be made jointly with the Bonneville Power Administration, a federal entity, which is studying future power needs in the Pacific northwest. To add to the utility's financial problems, the federal judge in the WPPSS-Western Nuclear litigation has ruled that the supply contract between the two companies signed in 1975 is enforceable and that WPPSS must pay for past refused deliveries as well as damages to Western Nuclear for any future refused deliveries.

New Mexico and Arizona Land Company (NMAL) is essentially out of the uranium producing business now that NMAL has terminated its forty percent interest in

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the Ruby uranium mine located in New Mexico. That forty percent interest now reverts to Western Nuclear, which has indicated it has no plans to close the mine.

Conoco has requested permission to begin minor reclamation work at the Conquista mine and mill, once the operation shuts down in mid-1982. Conoco will continue in the uranium business with output coming from a joint venture operation at Benavides, Texas and its own in-situ project at Trevino, Texas which began production in 1981.

A Nuclear Regulatory Commission staff report presented to Congress in March listed 19 nuclear power plants with construction permits which, in the staff's opinion, would be cancelled or indefinitely deferred. That the opinion was admittedly based on "conjecture, newspaper articles, conversations with financial houses, and hearsay rather than any official announcement from the applicant" has not kept the report from becoming controversial.

Ten of the nineteen plants are among the fourteen reactors Nuexco expects to be cancelled as discussed in Nuexco Report 161 of January 1982. Nuexco's forecast of Apparent Future Consumption detailed in Table 4 of this Report includes nine of the listed reactors, but their forecast dates of commercial operation are less optimistic than the owner's plans.

The nineteen reactors and their percentages of completion as given in the Nuclear News World List of Nuclear Power Plants as of December 31, 1981 are shown below.

Although uranium business in the US has been transacted for several years with the ever present possibility of a renewed embargo on foreign uranium, few in the industry believed that one would be reinstated. However, with the limitation of foreign uranium due to be lifted next year and today's depressed market, there have been increased efforts to reestablish an import quota. A hearing on the viability of the US uranium mining and milling industry was held in September and now some definitive action has taken place. By means of a last-minute parliamentary maneuver, the pro-embargo forces have managed to attach a piece of embargo legislation to an NRC budget authorization bill.

NRC budget legislation was passed by both the House and Senate and is due to go to conference committee. An amendment to the bill included a mill tailings act. The Senate version of the bill has, attached to it, a rider which would limit the amount of foreign uranium a US utility could use. As written, the rider calls for the establishment of criteria for issuing licenses for importing source material and special nuclear material such that 80 percent of the future fuel needs of a licensed facility would be supplied from material mined and milled in the US.

Differences in the two bills, especially the rider attached to the Senate version, must be reconciled in a conference committee made up of members from both the House and Senate. A final version would go before President Reagan for signature and could become law.

Reactor	Utility	% Complete 12/31/81
Cherokee 1,2,3	Duke Power	18,0,0
Clinton 2	Illinois Power	0
Grand Gulf 2	Mississippi Power & Light	22
Harris 2	Carolina Power & Light	4
Hartsville B1, B2	Tennessee Valley Authority	17,7
Limerick 2	Philadelphia Electric	30
Marble Hill 2	Public Service of Indiana	14
Nine Mile Pt 2	Niagara Mohawk	37
North Anna 3	Virginia Electric Power	9
Phipps Bend 1,2	Tennessee Valley Authority	25,5
River Bend 2	Gulf States Utilities	0
Seabrook 2	Public Service of New Hampshire	9
South Texas Unit 2	South Texas Project	23
Vogtle 2	Georgia Power	9
Yellow Creek 2	Tennessee Valley Authority	3

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MARKET ACTIVITIES

The conference committee will include senators from New Mexico, Colorado and Wyoming, states in which the future of the US uranium industry is a critical issue. Thus, there will be pressure from the Senate side to retain the embargo provisions in the final version.

The rider contains a clause which would exclude existing contracts from the restriction, provided that the contracts were consummated before the bill was signed into law by President Reagan. Those US producers who have contracted to purchase foreign uranium as an alternative to producing uranium would probably be protected as long as their contracts to supply the uranium were in effect prior to the signing of the bill. Any domestic producers who contracted to purchase foreign uranium ahead of a related delivery contract would probably not be eligible to deliver the uranium under the Senate version.

At press time, word of the passage of the Senate version had just begun spreading. It is difficult to assess the likelihood that the embargo rider will survive the conference committee. The senators from the uranium industry states are expected to fight hard for its passage in the conference committee. For example, State Department sources are concerned that Australia and Canada might impose retaliatory trade restrictions. Whatever the outcome, Senator Domenici has achieved his objective, to revive interest in the issue.

The rider, as it applies to the import restriction, is reproduced below:

Subsection E, Section 62 of the Atomic Energy Act of 1954 as amended is amended by designating existing Section 62 and Subsection 62a and by adding a new Subsection 62b to read as follows:

Reporting requirements for importing source and special nuclear material.

The commission shall establish by rule criteria for the issuance of specific or general licenses for importing source material and specific or general licenses for importing special nuclear material that will provide for essential security interests of the United States by insuring sufficient domestic mining and milling capacity to supply long-term domestic source material requirements. The criteria shall include such reporting requirements as the commission deems necessary to ensure compliance with the criteria established pursuant to this Subsection.

The criteria shall also provide for such essential security interests by establishing restrictions on importing source materials and special nuclear material from foreign sources sufficient to ensure that no less than 80% of the future fuel needs of any facility licensed or required to be licensed under Section 103 or 104b of this Act other than a facility licensed for purely research purposes or a facility described in paragraph 1 or 2 of Section 202 of Public law 93-438, are supplied only by source material mined, milled in the United States. Existing contracts for foreign source material consummated prior to the date of enactment of this Subsection shall be excluded from this restriction to the extent that contracted supplies from foreign sources exceed the permitted level.

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MARKET DATA

URANIUM SUPPLY

Nuexco Reference Number	Delivery Period[1] (Thousands of Pounds U_3O_8) 0 to 1 Year	Beyond 1 Year	Remarks
Available for Sale:			
Active			
1475	1,500		UF_6
1490	800		
1575		500 per year	Long Term
1584	500		
1610	200		
1637	500		
1684	500		UF_6
1739	1,600		UF_6
1807	700		
1872	340		
1877	50		
1895	1,900		UF_6
1906	230		
1907	130		UF_6
1909	2,200		UF_6
TOTAL:	11,150		
Inactive			
1581B		150 per year	Long Term
1664	100		
1738	750		UF_6
1774	50		
1804	615		
1805		500 per year	Long Term
1810	750		
1812A	800		
1814	250		
1818		250 per year	Long Term
TOTAL:	3,315		

[1]Measured from the date of this Report

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MARKET DATA

URANIUM SUPPLY

Nuexco Reference Number	Delivery Period[1] (Thousands of Pounds U_3O_8) 0 to 1 Year	Beyond 1 Year	Remarks
Available for Loan:			
Active			
1785	1,000		
1815	1,000		
1910	1,000		
TOTAL:	3,000		
Inactive			
1695	225	325 per year	Long Term, as UF_6
1742	200		
1884	275		
TOTAL:	700		
Inquiries to Borrow:			
Active			
1780	500		
1812	800		
TOTAL:	1,300		
Inactive			
1621	300		
1885		600	
1890		500	
TOTAL:	300	1,100	

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MARKET DATA

URANIUM DEMAND

Nuexco Reference Number	Delivery Period[1] (Thousands of Pounds U_3O_8) 0 to 1 Year	Beyond 1 Year	Remarks
Inquiries to Purchase:			
Active			
1410		1,500 per year	5 M lbs. Total
1699	500		
1744	1,000		
1842		500 per year	2 M lbs., start 85
1868	300	300 per year	Long Term
1871	250	250 per year	1983-86
1896	100		UF_6
TOTAL:	2,150		
Inactive			
1459		200 per year	Long Term
1634	400		
1841	100		
1888		500 per year	Long Term
1889		500 per year	Long Term
TOTAL:	500		

[1]Measured from the date of this Report.

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MARKET DATA

Market Opportunities are *active* inquiries in the secondary market for UF_6 conversion services. The data presented in this section are in no way intended to be indicative of the entire market for the time period covered.

CONVERSION SUPPLY

Nuexco Reference Number	Delivery Period[1] (Thousands of Pounds U as UF_6)		Remarks
	0 to 1 Year	Beyond 1 Year	
Active			
1584	350	300 per year	Long Term
1607	1,000		
1609	500	1,500 per year	Long Term
1684	450		
1840	300		
1886	500		
TOTAL:	3,100		
Inactive			
1451	75		
1619		300	
1661	200		
1764	100		
TOTAL	375		

CONVERSION DEMAND

Nuexco Reference Number	Delivery Period[1] (Thousands of Pounds U as UF_6)		Remarks
	0 to 1 Year	Beyond 1 Year	
Active			
1622	500	900	
1896	100		
TOTAL:	600		
Inactive			
1594	400	450 per year	Long Term
TOTAL:	400		

[1]Measured from the date of this Report.

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MARKET DATA

CURRENT TRANSACTIONS[1]

Uranium Transactions

Nuexco Reference Number	Delivery Period	Approximate Quantity (thousands of pounds, U_3O_8 equivalent)	Approximate Price as Percent of Current E.V.	Seller Group	Buyer Group	Remarks
1737	82	50-100	102	unknown	Europe	
1740	82	less than 50	98	US	US	
1741	82	101-300	102	US	US	
1750	82	0-50	98	US	US	
1758	82	301-600	101	US	US	
1761	82	101-300	102	US	Europe	

Conversion Transactions

Nuexco Reference Number	Delivery Period	Approximate Quantity (thousands of pounds, U equivalent)	Approximate Price as Percent of Current C.V.	Seller Group	Buyer Group	Remarks
1746	1983	301-600	100	US	Europe	

[1]Transactions listed include not only those in which Nuexco was involved, but also all others of which Nuexco is aware.

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MARKET ANALYSIS

FORECAST OF URANIUM PRODUCTION

This Report presents Nuexco's latest forecast of uranium production for the world outside Communist areas (WOCA). Those forecasts are quantified in Tables 1, 2 and 3. Table 1 summarizes Nuexco's forecast of US production of U_3O_8 for centers operating or under construction as of December 31, 1981. Table 2 shows Nuexco's forecast of world U_3O_8 production by region; Table 3 contains the same production estimates segmented according to status of the production center.

Production centers are divided into categories, according to stage of development, as follows:

1. Operating production centers — those which have shipped U_3O_8 in commercial quantities on or before December 31, 1981.

2. Production centers under construction — those which were being built as of December 31, 1981, and which have an established access to ore reserves. Conventional production centers are included in this category only if mill construction has actually begun.

3. Planned production centers — those for which firm development and construction commitments had been made as of December 31, 1981, and which Nuexco believes will be economically viable based on Nuexco's most recent price forecast.

Each category is further divided, according to source, as follows:

1. Conventional milling
2. Unconventional recovery methods:
   — Solution mining, including *in situ* leaching and hydraulic mining
   — Phosphoric acid by-product recovery
   — Heap leaching, including leachings of tailings and copper dumps

The forecast detailed in Table 1 calls for annual US production to decline from 38.7 million pounds U_3O_8 in 1981 to about 28 million pounds in 1982. The forecast calls for that twenty-eight percent decline to be followed by a further decline of twenty-four percent next year, so that 1983 US production of U_3O_8 will only slightly exceed 21 million pounds U_3O_8. That level is almost exactly half as much as the 1980 peak of almost 43 million pounds U_3O_8. The forecast calls for the US U_3O_8 production rate to decline to about 18 million pounds per year in 1985 through 1988 and then to decline to 13 million pounds per year by 1991. As in previous Nuexco forecasts, the decrease is due to declining ore grades, depletion of orebodies and production cutbacks due to high costs and low prices. Other factors important to the forecast are:

1. Nuexco's belief that US utilities will not be willing to subsidize high-cost US producers by paying a substantial premium for US-origin U_3O_8.

2. Nuexco's belief that the US government will not erect barriers to the importation of large quantities of uranium, up to two-thirds of annual *unfilled* requirements of US utilities.

The forecast detailed in Table 2 calls for WOCA uranium production to total approximately 108 million pounds in 1982, down slightly from the 1981 level of approximately 112 million pounds U_3O_8. The forecast calls for the total to decline slightly over the next four years, but to remain above 100 million pounds throughout the next ten years. Increased demand for uranium in the mid-1980s would raise prices and stimulate production. That influence accounts for the forecast production increases in the latter half of the period, from 109 million pounds U_3O_8 in 1987 to 117 million pounds in 1991. As US production declines, other production will increase, so that the US portion of the total declines steadily from 26 percent in 1980 to 17 percent in 1985 and 11 percent in 1991.

The reasons behind Nuexco's forecast of declining US production, briefly discussed in this article, have been detailed in previous Reports. However, the reasons for other producers' ability to expand production under the same market conditions bear repeating. The reasons include:

1. The continuing decline in spot market prices has affected uranium producers in the rest of the world more slowly and to a lesser extent than in the US.

2. Outside the US, these effects have so far been limited to a few commercial producers of uranium, as opposed to captive producers.

3. Some older non-US production facilities can be expected to phase out due to the same pressures of high cost and low grade which affect US producers, but the resulting decreases in production will be more than offset by new production from high-grade reserves in Canada and Australia.

4. Production arising from facilities captive to aggressive national nuclear power programs will also help to offset the forecast decline in US production. Active promotion of nuclear power by the governments of several nations allows them to use longer planning horizons than their US counterparts. Additionally, much of the important production outside the US is

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dedicated to attaining and sustaining national self-sufficiency in the nuclear fuel cycle, at least in nuclear raw materials. For these reasons, much of what might otherwise be excess or economically marginal uranium production outside the US will continue in operation.

The forecast of world production presented herein necessarily reflects some subjective opinions about commercial decisions which will be faced over the next few years by uranium producers. The decisions include whether to:

1. Continue funding some projects already under construction;
2. Expand exploration programs, terminate them or to continue them at some intermediate level;
3. Postpone or terminate planned expansions;
4. Continue uneconomic or marginal mining and milling operations in the hope of near term improvement in the spot market price;
5. High-grade where possible, in effect sacrificing mine life for short-term improvements in average cost of production;
6. Divest themselves of less attractive mining or milling operations;
7. Withdraw altogether from uranium mining and milling.

Those decisions will be based on many factors, but the ultimate outcome of production decisions will most probably be determined by the economics of free market competition. The major exceptions will be certain producers captive to electric utilities or national nuclear power programs.

Table 1

US URANIUM PRODUCTION FORECAST
(millions of pounds U_3O_8)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Operating										
Conventional Mills	20.0	13.7	12.3	11.1	12.2	12.5	12.5	11.5	11.0	9.5
Unconventional Sources	7.3	6.5	5.7	5.5	4.6	4.5	4.4	4.0	3.5	3.4
Subtotal:	27.3	20.2	18.0	16.6	16.8	17.0	16.9	15.5	14.5	12.9
Under Construction (as of December 31, 1981)	0.7	1.0	1.0	1.0	1.0	0.8	0.8	0.8	0.4	0.4
TOTAL	28.0	21.2	19.0	17.6	17.8	17.8	17.7	16.3	14.9	13.3

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MARKET ANALYSIS

Table 2

WORLD URANIUM PRODUCTION FORECAST[1]
(millions of pounds U_3O_8)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Australia	11.1	10.3	10.3	8.2	7.0	8.4	11.2	14.0	14.0	17.0
Canada	18.9	21.4	23.4	23.2	28.2	29.7	30.7	30.7	30.7	34.7
Central Africa[2]	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4
France	6.7	7.1	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
Namibia	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Republic of South Africa	16.5	17.6	18.4	18.3	18.1	17.8	17.8	17.8	17.8	17.8
Other Nations[3]	2.5	4.0	4.0	4.0	4.0	4.0	4.0	3.6	3.6	3.5
Non-US Total	79.6	83.8	87.1	84.7	88.3	90.9	94.7	97.1	97.1	104.0
US[4]	28.0	21.2	19.0	17.6	17.8	17.8	17.7	16.3	14.9	13.3
TOTAL (rounded)	108	105	106	102	106	109	112	113	112	117

[1]Outside Communist areas
[2]Niger and Gabon
[3]Argentina, Belgium, Brazil, Chile, Mexico, Portugal, Spain and others
[4]This report, Table 1

Table 3

WORLD URANIUM PRODUCTION FORECAST[1]
(millions of pounds U_3O_8)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Operating										
US	27.3	20.2	18.0	16.6	16.8	17.0	16.9	15.6	14.5	12.9
Non-US	77.6	75.9	75.0	72.6	72.3	73.4	73.4	73.4	73.4	73.4
Subtotal	104.9	96.1	93.0	89.2	89.1	90.4	90.3	89.0	87.9	86.3
Under Construction										
US	0.7	1.0	1.0	1.0	1.0	0.8	0.8	0.8	0.4	0.4
Non-US	1.9	4.8	6.0	6.0	6.0	6.1	6.0	5.6	5.7	5.6
Subtotal	2.6	5.8	7.0	7.0	7.0	6.9	6.8	6.4	6.1	6.0
Planned										
US	0	0	0	0	0	0	0	0	0	0
Non-US	0	3.0	6.0	6.0	10.0	11.4	15.2	18.0	18.0	25.0
TOTAL (rounded)[2]	108	105	106	102	106	109	112	114	112	117

[1]Outside Communist areas
[2]Any inconsistencies between this table and Table 2 are due to rounding.

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FORECAST OF APPARENT FUTURE CONSUMPTION

This Report presents Nuexco's forecasts of Apparent Future Consumption of U_3O_8 and installed nuclear electric generating capacity, as of December 31, 1981. As used by Nuexco, the term "consumption" refers to U_3O_8 entering (at the conversion facility) the pipeline for eventual fabrication into nuclear fuel. The forecasts are quantified in Tables 4 and 5, respectively.

These forecasts differ only slightly from those presented in Report 159, reflecting a substantially smaller change than might have been expected based on the public record. Virtually all of the cancellations and schedule delays which have been announced in the past 18 months had already been incorporated into the forecasts published in Reports 147 and 159.

As of 1982, Europe is the buyer region having the highest consumption rate of uranium. European consumption is forecast to exceed US consumption in 1982 by fifteen percent. The Nuexco forecast calls for that margin to increase to twenty percent by 1991.

Methodology

The methodology used in developing Nuexco's forecasts of Apparent Future Consumption and installed nuclear electric generating capacity is summarized below:

1. Tails assay is assumed to be 0.20 percent U_{235}. For each increase of 0.05 percent U_{235} in the tails assay, U_3O_8 consumption rises by approximately nine percent.

2. Capacity factor for each reactor is forecast according to elapsed time since that reactor's date of commercial operation. The method is based upon the application of historical capacity factor data to a power curve of the form,

$$y = a\,x^b$$

where:

y = annual capacity factor in percent;
x = years since date of commercial operations;
a and b are empirically determined constants.

It is a commonly held belief that achievable capacity factor varies with reactor size. Nuexco grouped the world's reactors according to region and type (US LWRs, CANDUs, European LWRs, AGRs, etc.)

Applying a simple regression analysis to historical operating data, Nuexco determined the constants a and b for each grouping of reactors. In the range of 150 MWe to 1,250 MWe, differences in reactor size had no significant effect on capacity factor, within the limits of the analysis. Using this method of predicting capacity factor reduces forecast consumption by a worldwide average of approximately ten percent.

3. Reactor physics improvements are incorporated into the forecast as indicated in Table 6 for PWRs. Similar data apply to BWRs.

The two principal forces stimulating the development of more efficient fuel are:

a. Competition among fuel fabricators, particularly for reload fuel orders. This has led to more efficient fuel designs being proposed by the fabricators.

b. The trend toward refueling cycles of eighteen months or longer.

Each of these forces acts to increase the energy content in a given fuel rod. The effect is to reduce the uranium weight in the fuel rod or to increase the average fuel exposure or both. Of course, these changes lead to increases in average levels of enrichment and in the average expected capacity factor. Thus, essentially all important variables in the uranium consumption calculation for reload fuel (and initial core fuel to a lesser extent) will change. These changes in fuel design variables apply to essentially all plants which entered commercial operation after January 1969.

The INFCE report referenced in Table 6 discusses nine methods for improving uranium utilization in LWR plants:

a. Increased burnup (MWD/MTU)
b. Lattice changes
c. Spectrum shift
d. Enrichment zoning, including blankets
e. Full use of early batches of startup core
f. Improved fuel management and control design
g. End-of-cycle coastdown
h. Reconstitution/inversion of BWR fuel
i. Increased frequency of refueling

The INFCE report postulated improvements ranging from 15 to 30 percent. Nuexco, believing that the INFCE targets were too optimistic for general application to LWR plants, chose lower improvements for the forecast. For example, Table 6 postulates improvements of 3.4 percent by 1985 and 9.7 percent by 1990 for PWR plants. Nuexco's assumption of modest improvements in uranium utilization was implemented wholly by increasing fuel exposure. That approach allowed for progress in the other eight areas of potential fuel improvement, but recognizes that, in reality, all fuel parameters would have to be considered in the design process.

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A similar approach was followed for heavy water reactor plants, where modest improvements in uranium utilization were assumed by 1985, but larger gains were instituted by 1990 through the use of slightly enriched uranium (1.20 percent U_{235}) in reload fuel. For conservatism, no improvements were assumed for gas-cooled reactor plants.

4. Factors considered in forecasting additions to installed capacity are:

a. Construction progress to date for individual nuclear plants and the owner utility's construction experience for conventional as well as nuclear units;

b. The owner utility's financial condition and the estimated likelihood of relief from ratemaking bodies;

c. Forecasts of growth in demand for electricity;

d. Societal constraints, such as the active opposition of anti-nuclear pressure groups;

5. Uranium is deemed to have been consumed when it has entered the conversion-enrichment-fabrication pipeline for ultimate use in a reactor.

6. Reactor loading is calculated for each reactor type, based on its particular reactor physics.

7. The forecasts assume that:

a. U_3O_8 deliveries for first cores predate commercial operation by two years;

b. U_3O_8 delivery for each reload predates refueling outage by 18 months.

8. Using the assumptions listed above, the consumption for a given reactor can be computed as a function of thermal power, capacity factor, fuel exposure, enrichment level, process losses, tails assay and commercial operating date.

9. Actual commercial operating dates can vary widely from published dates. Nuexco uses the best information available, much of it from unpublished sources, to prepare its own forecasts of operating dates. Such information often changes more frequently than does public information; Nuexco attempts to anticipate such changes as much as possible.

Limitations

Limitations of the forecasts detailed in Tables 4 and 5 are as follows:

1. Forecasts of Apparent Future Consumption are not forecasts of actual uranium demand. Rather, these forecasts comprise a portion of uranium demand more commonly referred to as reactor demand or reactor requirements. As indicators of the amount of uranium which will be needed to fuel the reactors under consideration, these forecasts should be regarded as relatively hard demand in the sense that this portion of demand is quite insensitive to uranium prices. Market demand for the assumed pattern of capacity additions can be higher or lower, depending on users' inventory policies.

2. Factors which can cause demand to exceed Apparent Future Consumption are:

a. Utility buyers plan their procurement strategies to achieve a very high probability of having access to at least enough uranium to meet commitments as they arise;

b. Accelerated reactor construction schedules can advance the dates of uranium need;

c. Buyers may elect to purchase uranium in excess of need, simply to enhance security of supply;

d. Utility obligations to suppliers of fuel cycle services such as conversion, enrichment or fabrication, may require earlier purchase of uranium than a reactor's operating schedule would otherwise indicate.

3. Demand can fall short of Apparent Future Consumption if uranium inventories are reduced in order to fill needs which would otherwise appear as demand.

4. Reactors fueled by the USSR are excluded from Nuexco's forecasts. Although Soviet bloc reactors account for substantial demand, Soviet participation in uranium trading in the Western market has been negligible and appears likely to remain so.

5. Nuexco forecasts include provisions for some US reactor plant orders which have not yet been placed, but they have no effect on consumption or installed capacity until after 1991. Nuexco forecasts include provisions for the startup of some reactors not yet ordered in France and Japan. Those units are included based on the shorter construction cycles prevalent in those countries. Also, their planning and approval processes are such that substantial site and engineering planning is done before actual orders are placed.

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MARKET ANALYSIS

Table 4

APPARENT FUTURE CONSUMPTION[1]
(millions of pounds U_3O_8)

Buyer Group	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
United States										
Reactors Now Operational	17.8	18.4	18.6	18.8	18.8	18.7	18.7	18.5	18.3	18.3
Now Under Construction	3.5	9.8	9.9	12.6	17.2	16.9	18.4	19.7	19.4	17.8
Now On Order/Planned	0	0	0	0	0	0	0	0	0	0
US Subtotal	21.3	28.2	28.5	31.4	36.0	35.6	37.1	38.2	37.7	36.1
Europe										
Reactors Now Operational	17.9	19.0	19.9	20.3	20.5	20.6	20.2	19.4	19.0	19.0
Now Under Construction	6.6	17.1	13.2	14.3	19.0	19.4	19.5	20.1	18.2	18.5
Now On Order/Planned	0	0	0	0	0	0	5.1	4.3	2.9	5.8
Europe Subtotal	24.5	36.1	33.1	34.6	39.5	40.0	44.8	43.8	40.1	43.3
Far East[2]										
Reactors Now Operational	4.2	4.1	4.0	3.9	3.8	3.7	3.6	3.4	3.3	3.3
Now Under Construction	2.5	1.5	5.7	5.8	5.0	6.1	5.6	4.4	4.1	4.1
Now On Order/Planned	0	0	0	0	1.1	0.9	1.7	2.5	3.1	3.1
Far East Subtotal	6.7	5.6	9.7	9.7	9.9	10.7	10.9	10.3	10.5	10.5
Other Free World[3]										
Reactors Now Operational	2.1	2.1	2.1	2.0	2.0	1.9	1.8	1.8	1.7	1.7
Now Under Construction	1.9	3.2	3.2	3.4	4.0	4.1	3.7	3.0	3.4	3.4
Now On Order/Planned	0	0	0	0	0.7	0.6	0.7	2.3	3.0	2.4
Other Subtotal	4.0	5.3	5.3	5.4	6.7	6.6	6.2	7.1	8.1	7.5
FREE WORLD[3] TOTAL:	56.5	75.2	76.6	81.1	92.1	92.9	99.0	99.4	96.4	97.4
Worldwide Breakdown by Status										
Reactors Now Operational	42.0	43.6	44.6	45.0	45.1	44.9	44.3	43.1	42.3	42.3
Now Under Construction	14.5	31.6	32.0	36.1	45.2	46.5	47.2	47.2	45.1	43.8
Now On Order/Planned	0	0	0	0	1.8	1.5	7.5	9.1	9.0	11.3

[1]Computed quantities of U_3O_8 which would be used under the given conditions to fabricate fuel for loading and reloading reactors operating, under construction or on order as of December 31, 1981. Compiled and computed on a reactor by reactor basis, quantities for each reactor are based on specific core characteristics, 0.20% tails assay, no recycling, 24-month lead time for procuring first cores and 18-month lead time for procuring each reload. Where reload schedule is not already known, these estimates assume reloads occur one year after commercial operation date and annually thereafter. Nuexco forecasts capacity factor for each reactor as a function of reactor type, country of operation and time since startup.

[2]Japan, Korea, Taiwan

[3]Excludes Bulgaria, Czechoslovakia, German Democratic Republic, Finland (two Russian reactors), Hungary, People's Republic of China, Poland, Romania, USSR

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MARKET ANALYSIS

Table 5

NUCLEAR ELECTRIC GENERATING CAPACITY[1] [2]
(thousands of MWe — net)

Buyer Group	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
United States										
Reactors Now Operational	55.8	55.8	55.8	55.8	55.8	55.8	55.8	55.8	55.8	55.8
Now Under Construction	3.9	8.4	14.1	23.0	28.2	34.8	41.9	48.7	54.3	59.5
Now On Order/Planned	0	0	0	0	0	0	0	0	0	0
US Subtotal	59.7	64.2	69.9	78.8	84.0	90.6	97.7	104.5	110.1	115.3
Europe										
Reactors Now Operational	53.2	53.2	53.2	53.2	52.6	52.6	52.3	50.5	49.1	49.1
Now Under Construction	4.6	14.9	19.6	31.2	38.2	42.3	49.8	55.5	61.6	64.1
Now On Order/Planned	0	0	0	0	0	0	0	0	5.3	7.5
Europe Subtotal	57.8	68.1	72.8	84.4	90.8	94.9	102.1	106.0	116.0	120.7
Far East[3]										
Reactors Now Operational	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4
Now Under Construction	0	2.2	4.2	5.1	9.3	12.3	14.0	15.8	18.6	18.6
Now On Order/Planned	0	0	0	0	0	1.1	1.1	1.9	2.9	3.8
Far East Subtotal	19.4	21.6	23.6	24.5	28.7	32.8	34.5	37.1	40.9	41.8
Other Free World[4]										
Reactors Now Operational	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
Now Under Construction	.6	2.1	4.7	7.8	9.6	11.3	13.5	14.7	14.7	14.7
Now On Order/Planned	0	0	0	0	0	0	0.6	0.6	1.5	3.6
Other Subtotal	7.3	8.8	11.4	14.5	16.3	18.0	20.8	22.0	22.9	25.0
FREE WORLD[4] TOTAL	144.2	162.7	177.7	202.2	219.8	236.3	255.1	269.6	289.9	302.8
Worldwide Breakdown by Status										
Reactors Now Operational	135.1	135.1	135.1	135.1	134.5	134.5	134.2	132.4	131.0	131.0
Now Under Construction	9.1	27.6	42.6	67.1	85.3	100.7	119.2	134.7	149.2	156.9
Now On Order/Planned	0	0	0	0	0	1.1	1.7	2.5	9.7	14.9

[1]Installed as of year end
[2]Uses Nuexco's estimate of commercial operating dates
[3]Japan, Korea, Taiwan
[4]Excludes Bulgaria, Czechoslovakia, German Democratic Republic, Finland (two Russian reactors), Hungary, People's Republic of China, Poland, Romania, USSR

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MARKET ANALYSIS

Table 6

COMPARISON OF THIRTY YEAR URANIUM REQUIREMENTS (MTU/GWe) FOR PWR PLANTS OF CURRENT AND IMPROVED DESIGN BETWEEN INFCE[1] AND NUEXCO[2]

		Nuexco Assumption for Plants Operating in:		INFCE Improved Design Leading to Uranium Savings of:	
	Current Design	1985	1990	15%	30%
INFCE[1] (MTU/GWe)	4,350			3,700	3,040
Nuexco[2] (MTU/GWe)	4,350	4,200	3,930		
Relative Improvement (%)	Base	3.4	9.7	15	30

[1]International Nuclear Fuel Cycle Evaluation, International Atomic Energy Agency, Vienna, 1980: Volume 8, Advanced Fuel Cycle and Reactor Concepts, Report of INFCE Working Group 8, pages 53-67. Adapted from Table V (page 67).
[2]Nuexco data normalized to INFCE conditions.

SUPPLY AND DEMAND ANALYSIS

The supply-demand analysis resulting from Nuexco's most recent forecasts of production and consumption of uranium is presented in Table 7 (WOCA) and Table 8 (US). Conclusions which may be drawn from the analysis include the following:

1. Table 7 shows forecast production exceeding forecast consumption in each year through 1991, implying that supply and demand will be balanced by an annual net increase in inventory. In actual practice, if supply exceeded demand over an extended period, the necessary balance would probably result from a combination of inventory purchases and reduced production.

2. The forecast inventory of approximately 426 million pounds of U_3O_8 equivalent as of January 1, 1982 represents more than five years of forward consumption. Inventory will increase steadily throughout the next ten years until it reaches approximately 630 million pounds U_3O_8 equivalent by 1991. Relative inventory is quite stable, however, increasing gradually from 5.5 years' forward consumption in 1982 to 6.5 years' forward consumption in 1991.

3. New reactor orders or political or national policy considerations may generate enough additional demand to absorb production from production centers planned, but not yet under construction. However, it is more likely that a major driving force behind any such additional production entering the market will be the displacement of other higher-cost production centers.

Table 8 shows Nuexco's analysis of forecast uranium supply and demand balance for the US. By reviewing the US situation alone, any potential market for imports or new US production can be identified. The analysis in Table 8 is of the same basic form as that of Table 7 (WOCA), but the US analysis includes an adjustment for US import-export commitments. Based on the US supply-demand balance, it may be concluded that:

1. In the US, consumption is forecast to exceed production annually, beginning in 1983. Forecast uranium production declines steadily throughout the period to less than half of the 1982 level. On the other hand, Apparent Future Consumption increases by approximately 50 percent between 1982 and 1985. Between 1985 and 1990, Apparent Future Consumption increases by about one-sixth, so that forecast Apparent Future Consumption in 1991 is almost triple forecast US production of U_3O_8.

2. Table 7 shows an annual US supply deficit beginning in 1983 and rising to more than 21 million pounds U_3O_8 in 1990 and 1991. Without additional imports or more US production, US inventory would decline to a level equivalent to approximately 18 months' forward consumption by 1990 or 1991.

Methodology

1. The two most critical assumptions in this analysis are:

a. Outside the US, supply and demand will be balanced by inventory accumulation and increased exports to the US, rather than by reducing production.

b. In the US, supply and demand will be balanced by inventory liquidation and increased imports, rather than by increasing production. It is possible that some US

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utilities' preference for domestic supply will induce them to subsidize some otherwise uneconomic US production, but Nuexco's interpretation of US utilities' attitudes indicates that this effect will be neither widespread nor substantial.

2. Another critical variable in the supply-demand analysis is the degree to which producers having existing contracts will elect to purchase rather than produce uranium. This applies especially to US producers, since the average cost of production in the US is above market price.

3. Inventory refers to uranium (U_3O_8, natural UF_6, enriched UF_6) owned by utilities, reactor manufacturers, fuel fabricators and national organizations which procure uranium for commercial purposes. The inventory amounts do not include strategic stockpiles, such as those owned by the US DOE. Difficulties in accounting precisely for the variety of possible forms, location and ownership of inventory necessarily result in some uncertainty in estimating total world inventory. Nuexco's estimate of worldwide inventory as of the beginning of 1982 is approximately 426 million pounds U_3O_8 equivalent; however, the uncertainty factor of this estimate is ten to fifteen percent. More important is the fact that the primary conclusions of this analysis are not sensitive to beginning inventory variations of ten to fifteen percent.

4. The analysis assumes that US utilities will be able to buy approximately one-third of their *unfilled* requirements from domestic sources.

Table 7

URANIUM SUPPLY-DEMAND BALANCE: FREE WORLD[1]
(millions of pounds U_3O_8)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
PRODUCTION[2]										
Operating Production Centers	104.9	96.1	93.0	89.2	89.0	90.4	90.3	89.0	87.9	86.3
Facilities Under Construction	2.6	5.8	7.0	7.0	7.0	6.9	6.8	6.4	6.1	6.0
Planned Facilities	0.0	3.0	6.0	6.0	10.0	11.4	15.2	18.0	18.0	25.0
Total	107.5	104.9	106.0	102.2	106.0	108.7	112.3	113.4	112.0	117.3
less										
CONSUMPTION[3]	56.5	75.2	76.6	81.1	92.1	92.9	99.0	99.4	96.4	97.4
equals										
NET INVENTORY INCREASE	51.0	29.7	29.4	21.1	13.9	15.8	13.3	14.0	15.6	19.9
plus										
BEGINNING INVENTORY	426.1[4]	477.1	506.8	536.2	557.3	571.2	587.0	600.3	614.3	629.9
equals										
ENDING INVENTORY	477.1	506.8	536.2	557.3	571.2	587.0	600.3	614.3	629.9	649.8
RELATIVE INVENTORY (years)[5]	5.5	5.6	5.7	5.7	5.8	5.9	6.0	6.1	6.3	6.5

[1]Excludes Communist areas
[2]This report, Table 2
[3]This report, Table 4
[4]Nuexco estimate
[5]For each year, Relative Inventory equals the number of years' forward consumption which could be supplied by that year's Beginning Inventory.

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MARKET ANALYSIS

Table 8

URANIUM SUPPLY-DEMAND BALANCE: US
(millions of pounds U_3O_8)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
PRODUCTION[1]	28.0	21.2	19.0	17.6	17.8	17.8	17.7	16.3	14.9	13.3
less										
CONSUMPTION[2]	21.3	28.2	28.5	31.4	36.0	35.6	37.1	38.2	37.7	36.1
plus										
NET IMPORTS/(EXPORTS)[3]	0.2	0.8	2.1	(0.3)	1.3	0.5	1.0	1.1	1.1	1.3
equals										
SUPPLY SURPLUS/(DEFICIT)	6.9	(6.2)	(7.4)	(14.1)	(16.9)	(17.3)	(18.4)	(20.8)	(21.7)	(21.5)
plus										
BEGINNING INVENTORY	162.3[4]	169.2	163.0	155.6	141.5	124.6	107.3	88.9	68.1	46.4
equals										
ENDING INVENTORY	169.2	163.0	155.6	141.5	124.6	107.3	88.9	68.1	46.4	24.9
RELATIVE INVENTORY[4]	5.5	5.3	4.8	4.4	3.9	3.4	2.8	2.4	1.8	1.3

[1]This report, Table 1
[2]This report, Table 4
[3]Nuexco Report 163, Table 5
[4]Nuexco estimate
[5]For each year, Relative Inventory equals the number of years' forward consumption which could be supplied by that year's Beginning Inventory.

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RAW MATERIALS

CLUFF LAKE PROJECT — PART I

Introduction

Following the discovery of four uranium deposits in the Cluff Lake area of Northern Saskatchewan between 1967 and 1975, Amok, Ltd. perceived that a large development program would follow.

The Cluff Lake project actually had its beginning in 1964 when Amok, operating as Mokta Ltd. (Canada), began low-key uranium exploration in the Beaverlodge area north of Lake Athabasca. By 1967, Amok was conducting airborne radiometric surveys of about 15,000 square kilometers in three separate locations within the Athabasca Basin. Amok began a systematic survey in the vicinity of the Carswell Dome, located near the western edge of the basin about mid-1967. The Carswell Dome was selected as a prime target area because of obvious structural deformation of the Athabasca Formation. A number of low-intensity radiometric anomalies were detected within the structure near Cluff Lake in late 1967. Follow-up ground evaluation of the anomalies resulted in the discovery of high grade mineralized boulders in 1968. Amok immediately registered 13 claim blocks covering 120,000 acres within the domal structure. Figure 1 is a location map of the Cluff Lake area showing the relationship to other uranium deposits in the Athabasca Basin.

Subsequent detailed geologic exploration by Amok, including core drilling, led to the discovery of the high-grade "D" zone deposit in 1971. Exploration continued and by early 1975, several more important orebodies had been discovered. Two of the largest were designated as the "N" and the "Claude"; the final deposit was designated the "O-P" orebody. Total uranium reserves in the project area at that time were estimated by Amok at about 23,000 metric tons of uranium oxide. Since then, Amok's exploration program has made significant additions to the ore reserve total.

The Company

Mokta Ltd. (Canada) was formed for the sole purpose of exploring for uranium throughout Canada by its parent company, Compagnie de Mokta, in 1964. The name of the exploration company was changed to Amok, Ltd. (Canada) and was incorporated under a federal statute of the Canada Corporations Act in December 1967. The principal shareholders of Amok, Ltd. (Canada) are Compagnie de Mokta, Compagnie Francaise des Minerais d'Uranium, and Pechiney Ugine Kuhlman, S.A. and Commissariat a l'Energie Atomic.

Project operations were carried out under the company alignment described above until early 1980 when Saskatchewan Mining Development Corporation (SMDC), a Crown Corporation wholly-owned by the government of Saskatchewan, acquired a 20 percent undivided interest in the project. Following lengthy negotiations, SMDC agreed to make a payment of C$65 million to Amok, Ltd. In addition, SMDC agreed to pay 20 percent of all project costs retroactive to July 1, 1979. The joint venture ownership now consists of two companies:

1. Amok, Ltd. (Canada)	80%
Compagnie Francaise de Mokta	37%
Commissariat a l'Energie Atomic	30%
Pechiney-Ugine-Kuhlman	25%
Cogema	8%
2. Saskatchewan Mining Development Corporation	20%

The project is now operating under the new partnership as Cluff Mining.

Project Development

Amok, Ltd. had determined the presence of large quantities of uranium in four ore deposits at Cluff Lake by early 1975. Plans for project development were initiated almost immediately and on November 24, 1976, Amok, Ltd. submitted an Environmental Assessment and Safety Report for the project to the Saskatchewan Department of Environment. The Report was a comprehensive assessment of environmental, health and safety, and the social and economic effects of a uranium mining and milling project at Cluff Lake as proposed by Amok.

As a result of the Amok proposal, which at the time was not a condition for obtaining the necessary mining permits and licenses, the Minister of the Environment requested a public inquiry to review the Report for "broader and global implications" of an expanding uranium industry in Saskatchewan. On February 1, 1977, the Cabinet of Saskatchewan appointed a commission to conduct an inquiry concerning all aspects of the project. Known as the "Cluff Lake Board of Inquiry," the three member Board immediately engaged in the task.

The scope of the Inquiry was primarily twofold: to determine the environmental, economic and social impact of the Cluff Lake mine and mill project on a local and regional level, including the expansion of the uranium industry in Saskatchewan; and to render a decision whether the project should proceed, or proceed subject to specific conditions and recommendations.

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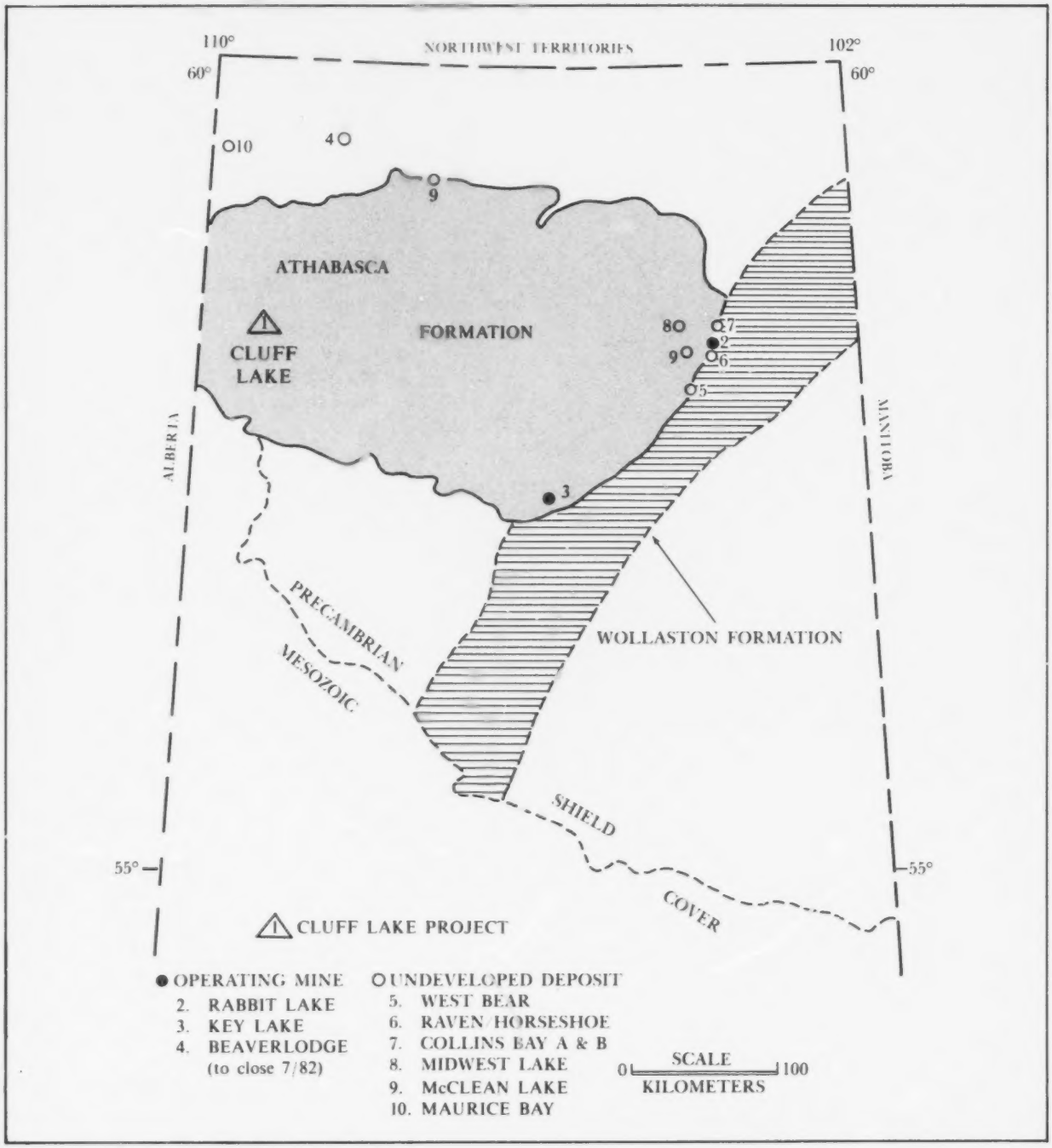

Figure 1

LOCATION OF THE CLUFF LAKE PROJECT WITH RELATION TO OTHER URANIUM DEPOSITS IN THE DISTRICT, NORTHERN SASKATCHEWAN

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The Board examined in depth all measures proposed by Amok regarding the health and safety of workers, the present and future environmental aspects of mining and milling, the economic, social and political considerations, plus a number of related issues that would develop during the life of the project.

The Board made specific recommendations relative to the different aspects of the project, many of which were in addition to the measures proposed by Amok. Perhaps the most significant recommendation relates to the emphasis placed on benefits to northern residents. The Board stressed the importance of royalty sharing to generate funds for permanent area development, plus a plan to increase the northerners' participation in the initiation, coordination and direction of economic and social development in northern Saskatchewan. The direct intent was to give the northerners more "control over their own lives." The Department of Northern Saskatchewan (DNS) assumed jurisdiction in such matters.

The Board submitted the final Report to the Cabinet on May 31, 1978. The Board's recommendation to proceed with the project was accepted by the government. Negotiations between DNS and Amok proved satisfactory and in September 1978, DNS approved a surface lease giving Amok the right to begin project development.

The surface lease covers 9,500 acres in the vicinity of the ore deposits and allows the necessary space for mine and mill sites and all support facilities. By accepting the lease, Amok assumed full obligation to operate within the designated area according to the terms and conditions of environmental and regulatory requirements of Canadian and Saskatchewan law.

Immediately after the surface lease was issued, Amok began development of the "D" orebody. Mill construction was started almost simultaneously with mine development. The construction schedule was accelerated following many months of delay, and finally initial production of uranium concentrate began in mid-summer 1980.

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STATISTICAL DATA

EXCHANGE VALUE $22.50/lb. U_3O_8
Determined as of March 31, 1982

Definition[1]

The Exchange Value is Nuexco's judgment of the price at which transactions for significant quantities of natural uranium concentrates could be concluded as of the last day of the month.

Derivation

Nuexco bases the Exchange Value upon:

A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.

Comments

Nuexco does not consider the following in determining the Exchange Value:

A. The price of uranium delivered or to be delivered under old contracts.
B. The price of uranium delivered in connection with contract renegotiations or other than arm's length transactions.

[1]In December, 1981, Nuexco published a history of the Exchange Value which chronicled, month-by-month, changes in its definition, usage and derivation. Copies are available upon request.

TRANSACTION VALUE[2]
Determined as of March 31, 1982

$/lb. U_3O_8	Millions of Pounds	Number of Transactions	Number of Months
23.40	2.8	12	3

Definition

The Transaction Value is a weighted average price of recent transactions, and is based on prices paid for U_3O_8 in transactions closed within the previous three-month period and for which delivery was scheduled within one year of the transaction date. At least ten transactions totaling at least two million pounds U_3O_8 are included in each calculation, or the sample time is extended as necessary to include these minima. Foreign currencies are converted to US dollars as of the transaction date.

[2]Transaction Values for 1976 through 1981 and their associated parameters (millions of pounds, number of transactions and number of months) are tabulated on pages 31 and 32 of Report 161.

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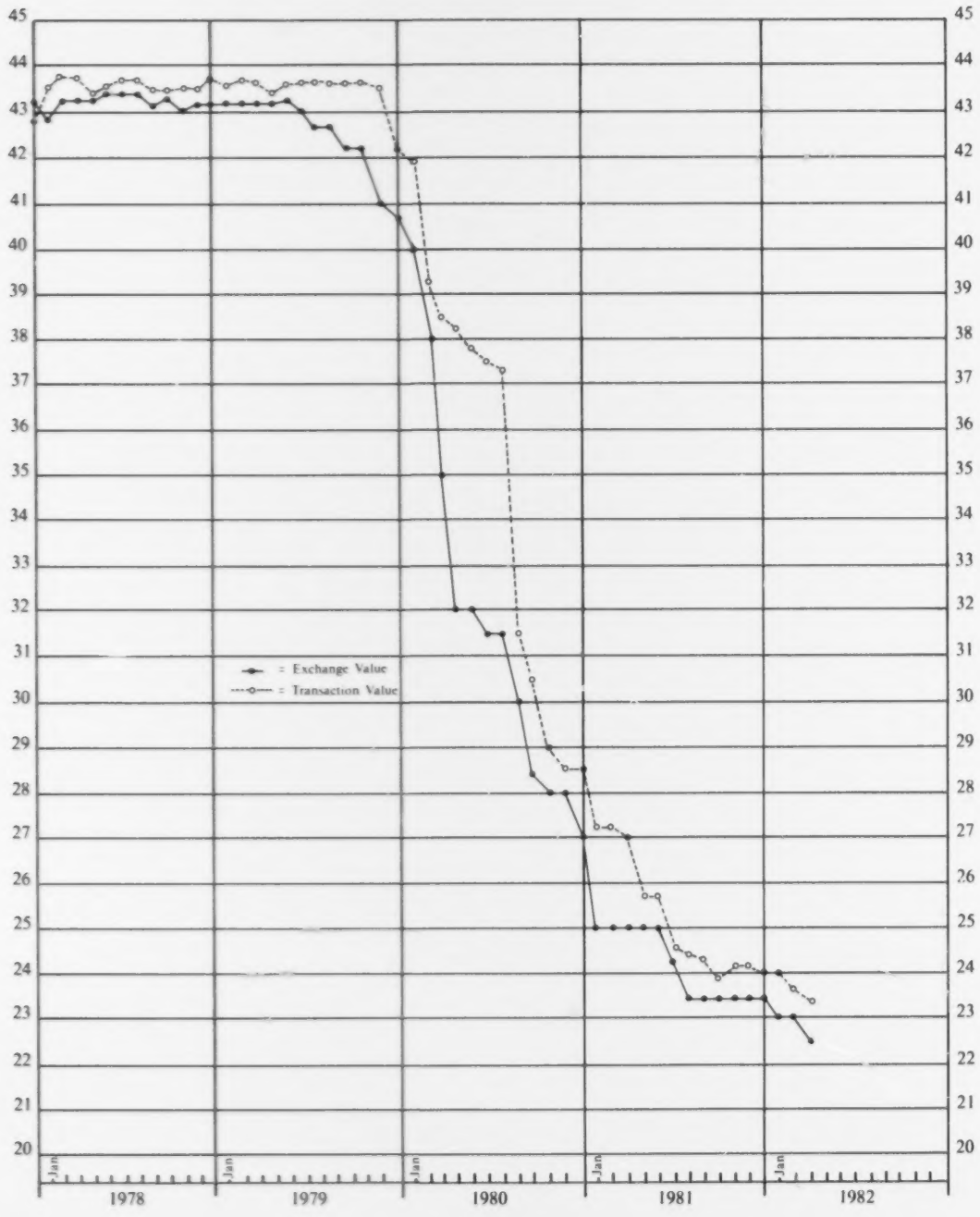
STATISTICAL DATA

EXCHANGE AND TRANSACTION VALUES
SINCE JANUARY 1978
Determined as of the last day of the month indicated



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STATISTICAL DATA

HISTORICAL EXCHANGE VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	6.35	6.35	6.40	6.45	6.50
1969	—	6.35	6.10	6.10	6.25	6.25	6.20	6.20	6.15	6.15	6.15	6.20
1970	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.20	6.15	6.15	6.15	6.15
1971	6.20	6.20	6.20	6.20	6.15	6.05	6.00	5.95	5.95	5.95	5.95	5.95
1972	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
1973	5.95	6.00	6.10	6.20	6.45	6.50	6.50	6.50	6.50	6.50	6.75	7.00
1974	7.70	7.90	8.00	9.00	9.50	10.50	11.50	12.00	12.50	14.00	14.75	15.00
1975	16.00	16.00	18.00	20.00	21.00	23.00	24.70	26.00	26.00	28.50	30.00	35.00
1976	35.20	37.00	39.25	40.00	40.00	40.00	40.00	40.40	41.00	41.00	41.50	41.00
1977	41.35	41.50	41.60	41.60	42.00	42.25	42.25	42.25	42.40	42.75	43.20	43.20
1978	42.90	43.25	43.25	43.25	43.40	43.40	43.40	43.10	43.25	43.00	43.25	43.25
1979	43.25	43.25	43.25	43.25	43.25	43.00	42.70	42.70	42.20	42.20	41.00	40.75
1980	40.00	38.00	35.00	32.00	32.00	31.50	31.50	30.00	28.50	28.00	28.00	27.00
1981	25.00	25.00	25.00	25.00	25.00	24.25	23.50	23.50	23.50	23.50	23.50	23.50
1982	23.00	23.00	22.50									

HISTORICAL TRANSACTION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976	—	—	—	—	39.60	39.70	39.70	40.40	40.30	40.60	40.70	40.70
1977	41.30	41.30	41.40	41.50	42.80	42.90	43.00	42.60	42.50	42.80	42.90	42.90
1978	43.10	43.30	43.70	43.60	43.60	43.20	43.30	43.40	43.40	43.60	43.40	43.70
1979	43.60	43.80	43.70	43.40	43.60	43.70	43.70	43.60	43.60	43.60	43.50	42.30
1980	42.00	39.30	38.60	38.40	37.90	37.60	37.30	31.60	30.60	29.00	28.70	27.70
1981	27.20	27.20	27.00	25.70	25.70	24.50	24.40	24.30	23.90	24.10	24.10	24.00
1982	24.00	23.70	23.40									

EXCHANGE VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country	per lb. U_3O_8 in Concentrates	per kg U_3O_8 in Concentrates	per kg U in Concentrates
US (dollar)	22.50	49.60	58.50
France (franc)	140.19	309.06	364.45
FRG (mark)	54.18	119.44	140.85
Japan (yen)	5,526	12,182	14,365
Switzerland (franc)	43.39	95.67	112.82
UK (pound)	12.61	27.80	32.78
Australia (dollar)	21.39	47.17	55.62
Canada (dollar)	27.60	60.84	71.75
Niger, Gabon (CFA)	7,031	15,501	18,280
South Africa (rand)	23.62	52.08	61.41
Sweden (kroner)	133.85	295.09	347.98

[1]Calculated using currency exchange rates published in the Wall Street Journal on the last business day of the month.

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STATISTICAL DATA

CONVERSION VALUE $1.20/lb. U as UF_6
Determined as of March 31, 1982

Definition

The Conversion Value is Nuexco's judgment of the price at which spot and/or near term transactions for significant quantities of conversion services could be concluded in the secondary market as of the last day of the month.

Derivation

Nuexco bases the Conversion Value upon:
A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.

Comments

Nuexco does not consider the following in determining the Conversion Value:
A. The price of conversion services delivered or to be delivered under old contracts.
B. The price of conversion services delivered in connection with contract renegotiations or other than arm's length transactions.

LOAN USE CHARGE RATE[1] 6%
Determined as of March 31, 1982

Definition

The Loan Use Charge Rate is Nuexco's judgment of the annual interest rate at which uranium loans could be concluded as of the last day of the month.

Derivation

Nuexco bases the Loan Use Charge Rate upon:
A. Data from recently completed or pending loan transactions.
B. Rates included in firm proposals to borrow or lend.
C. Rates that potential borrowers and lenders have expressed as a willingness to pay or accept, but for which Nuexco is not aware of firm proposals.

[1]Monthly data for 1968 through 1981 appear on pages 32-34 of Report 162.

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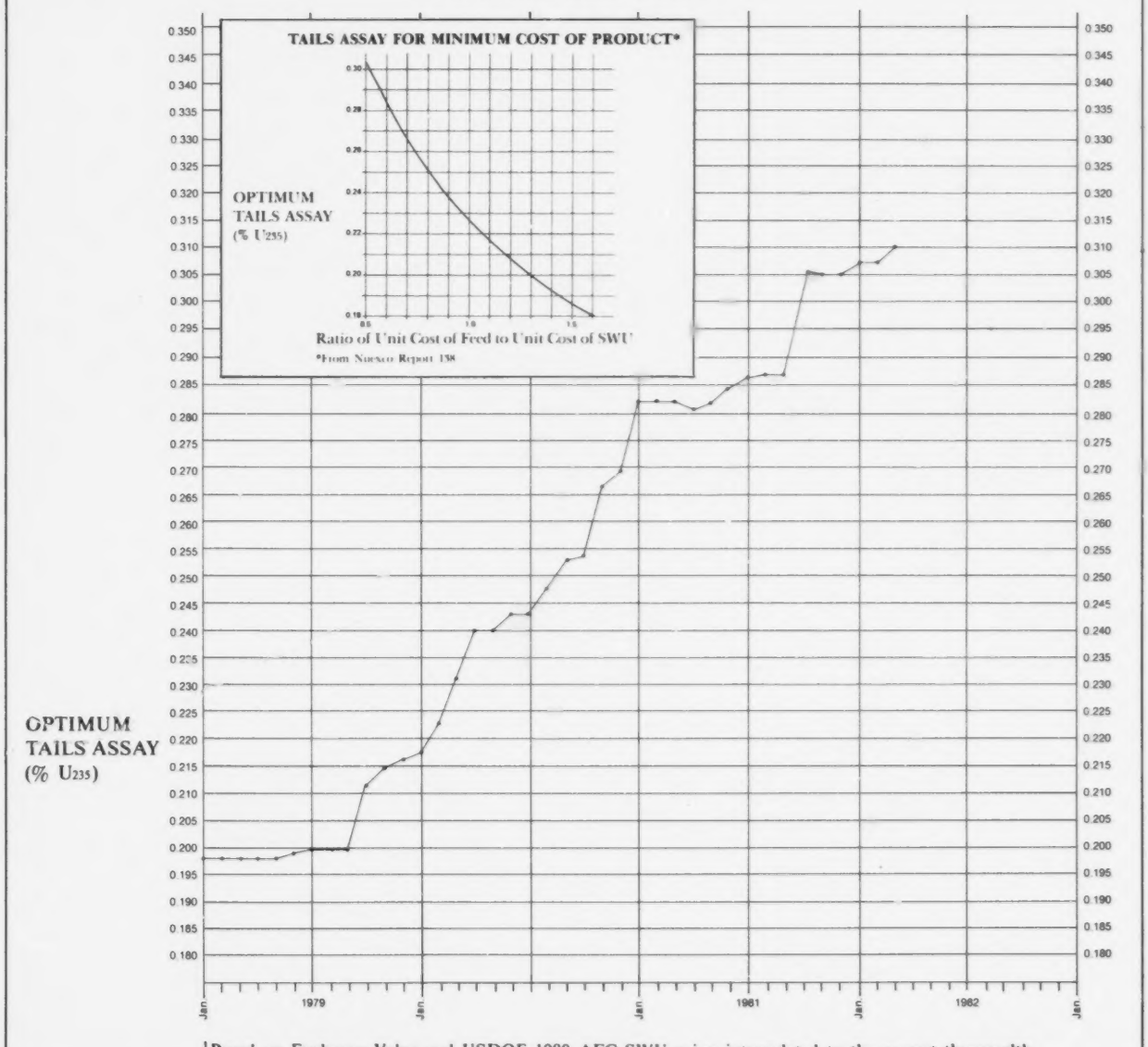
STATISTICAL DATA

OPTIMUM TAILS ASSAY

The optimum tails assay is the tails composition at which the cost of enriched uranium is lowest for given costs of separative work (SWU) and natural uranium feed. It depends only on the ratio of the cost of a kilogram of natural uranium in the form of UF_6 to the cost of a kilogram unit of separative work. Holders of US Department of Energy (USDOE) Adjustable Fixed Commitment (AFC) enrichment contracts have the option to specify, within limits, the transaction tails assay. The transaction tails assay for USDOE Requirements contracts is 0.2 percent U_{235}. For every one-hundredth of one percent increase in the transaction tails assay, natural uranium consumption increases about two percent.

OPTIMUM TAILS ASSAY[1]



[1]Based on Exchange Value and USDOE 1980 AFC SWU price; interpolated to the nearest thousandth.

STATISTICAL DATA

AUSTRALIAN GOVERNMENT STATISTICS

	Price Index of Materials Used in Manufacturing Industry—All Groups (Year 1968-69 = 100.0)[1]	Weighted Average Minimum Weekly Wage Rates—Adult Males Australia Mining and Quarrying (A$)[2]
Annual Avg. 1971[3]	101.5	65.95
Annual Avg. 1972[3]	105.6	71.26
Annual Avg. 1973[3]	124.4	78.96
Annual Avg. 1974[3]	141.9	108.07
Annual Avg. 1975[3]	150.4	132.55
Annual Avg. 1976[3]	168.4	160.93
Annual Avg. 1977[3]	192.0	179.03
Annual Avg. 1978[3]	198.5	190.04
Annual Avg. 1979	248.8	196.34
Annual Avg. 1980	321.8	218.01
Annual Avg. 1981	355.2	235.55R
Nov 1980	350.4	221.50
Dec 1980	351.7	222.41P
Jan 1981	357.8	230.58P
Feb 1981	356.6	230.41P
Mar 1981	355.2	229.66P
Apr 1981	354.6	229.38P
May 1981	353.4	237.31P
Jun 1981	360.4	237.62P
Jul 1981	356.9	237.54P
Aug 1981	359.7	237.54P
Sep 1981	357.2	237.51P
Oct 1981	351.4	238.95R
Nov 1981	350.2R	240.65R
Dec 1981	348.7P	256.43R
Jan 1982	352.7P	256.20P

P = Preliminary R = Revised since last month

[1]Australian Bureau of Statistics, Canberra: "Price Index of Materials Used in Manufacturing Industry" (Catalogue No. 6411.0), Table 3.
[2]Australian Bureau of Statistics, Canberra: "Wage Rates, Australia" (Catalogue No. 6312.0), Table 1. Figures for the latest fourteen months shown are subject to revision.
[3]Monthly data for 1970 through 1978 appear on pages 4.7 and 4.8 of Nuexco Report 138.

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STATISTICAL DATA

CANADIAN GOVERNMENT STATISTICS

	Industry Selling Price Index: Manufacturing (D 500000)[1] [2] (1971 = 100.0)	Wage-earner Data: Average Hourly Earnings (C$)[3] [4]		
		Metal Mining, including Milling (SIC 050-059)	Primary Metal Industries, non-ferrous (SIC 296-298)	Chemicals and Chemical Products (SIC 370-379)
Annual Avg. 1977	174.3	8.18	6.50	6.51
Annual Avg. 1978	190.4	8.76	6.82	6.97
Annual Avg. 1979	217.9	9.60	7.35	7.67
Annual Avg. 1980	247.2	10.59	8.05	8.50
Nov 1980	257.8	11.11	8.38	8.77
Dec 1980	258.4	11.13	8.32	8.92
Jan 1981	263.3	11.27	8.51	8.90
Feb 1981	263.7	11.43	8.59	9.00
Mar 1981	265.5	11.47	8.63	9.17
Apr 1981	267.9	11.73	8.76	9.33
May 1981	270.0	11.99	8.90	9.49
Jun 1981	272.3	12.03R	9.16	9.57
Jul 1981	274.3	12.07R	9.20	9.62
Aug 1981	276.1	12.19R	9.15	9.63
Sep 1981	276.8R	12.63	9.22	9.77
Oct 1981	279.0R	12.82	9.35	9.91
Nov 1981	278.5R	12.89R	9.45R	9.89R
Dec 1981	279.5R	12.87P	9.46P	10.06P
Jan 1982	281.0P	—	—	—

P = Preliminary R = Revised since last month

[1]Statistics Canada, Prices Division, Ottawa; "Industry Price Indexes" (Catalogue 62-011), Table 1. Indexes for the most recent six months shown are subject to revision.

[2]Monthly data for 1973 through 1978 appear on page 4.10 of Nuexco Report 138.

[3]Statistics Canada, Labour Division, Employment and Payrolls Section, Ottawa; "Employment, Earnings and Hours" (Catalogue 72-002), Table 2.

[4]Monthly data for 1977 and 1978 appear on page 4.11 of Nuexco Report 138.

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STATISTICAL DATA

REPUBLIC OF SOUTH AFRICA STATISTICS

	Average Declared Working Costs per Metric Ton of Gold Ore Milled (Rand)[1]	Consumer Price Index[2] (1975 = 100, except where otherwise indicated)	Wholesale Price Index All Groups (1975 = 100)	Total Employment in Mining and Quarrying (Code 35)[5]	Total Salaries and Wages in Mining and Quarrying (1,000 Rand) (Code 40)[5]
Annual Avg. 1970[3]	7.34	100.3[4]	—	655,346	399,164
Annual Avg. 1971[3]	7.88	106.4[4]	59.1	652,294	415,956
Annual Avg. 1972[3]	8.79	113.3[4]	63.9	623,067	443,933
Annual Avg. 1973[3]	10.51	124.1[4]	72.3	684,743	572,133
Annual Avg. 1974[3]	13.18	138.5[4]	85.3	674,140	761,596
Annual Avg. 1975[3]	16.71	157.2[4]	100.0	639,473	1,003,617
Annual Avg. 1976[3]	19.30	174.7[4]	115.1	671,240	1,212,983
Annual Avg. 1977[3] [6]	23.87	194.4[4]	130.0	712,006	1,420,670
Annual Avg. 1978[3] [6]	27.14	137.2	142.7	664,571	1,537,169
Annual Avg. 1979[3] [6]	30.18	155.3	164.5	692,209	1,830,632
Annual Avg. 1980[6]	35.53	176.7	192.1	714,379	2,279,615
Oct 1980	—	186.3	203.1	720,246	204,602
Nov 1980	—	187.8	205.6	716,797	208,345
Dec 1980	37.69	189.9	206.5	705,087	211,829
Jan 1981	—	191.0	207.2	729,575	219,969
Feb 1981	—	193.8	209.8	725,647	210,275
Mar 1981	39.26	195.2	209.9	705,010	210,151
Apr 1981	—	196.4	211.6	719,674	217,124
May 1981	—	197.7	213.2	726,869	219,880
Jun 1981	40.41	200.0	215.3	728,506	237,049
Jul 1981	—	204.6	218.4	735,839	249,080
Aug 1981	—	208.0	222.6	722,684	245,817
Sep 1981	43.28	211.6	224.6R	724,604R	251,502R
Oct 1981	—	213.4R	227.0	717,918	248,159
Nov 1981	—	214.8	229.4	720,255	253,044
Dec 1981	44.52	216.3	230.4	709,612	257,655
Jan 1982	—	217.6	—	—	—

[1]Chamber of Mines of South Africa, Johannesburg; "Analysis of Working Results," published quarterly.
[2]Republic of South Africa Department of Statistics, Pretoria; "Government Gazette: Consumer Price Index for Urban Areas."
[3]Historical data for the Average Declared Working Costs and Consumer Price Index 1970-1979 appear on page 4.9 of Nuexco Report 140.
[4]April 1970 = 100.00.
[5]Bulletin of Statistics, Department of Statistics, Pretoria.
[6]Historical data for Codes 35 and 40 1977-1980 appear on page 28 of Nuexco Report 157.

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STATISTICAL DATA

US GOVERNMENT STATISTICS

	Producer Price Index—Industrial Commodities (1967 = 100)[1]	Producer Price Index—All Commodities (1967 = 100)[1]	Consumer Price Index (1967 = 100)[2]	GNP Implicit Price Deflator (1972 = 100)[3]	Gross Average Hourly Earnings of Production or Non-supervisory Workers (US$)[4]			
					Metal Mining (SIC 10)	Primary Non-ferrous Metals (SIC 333)	Chemicals and Allied Products (SIC 28)	Electric and Electronic Equipment (SIC 36)
Annual Avg. 1971[5]	114.1	114.0	121.3	96.02	4.12	4.15	3.97	3.49
Annual Avg. 1972[5]	117.9	119.1	125.3	100.00	4.56	4.59	4.26	3.71
Annual Avg. 1973[5]	125.9	134.7	133.1	105.80	4.84	4.98	4.51	3.91
Annual Avg. 1974[5]	153.8	160.1	147.7	116.02	5.44	5.63	4.88	4.21
Annual Avg. 1975[5]	171.5	174.9	161.2	127.15	6.13	6.24	5.39	4.64
Annual Avg. 1976[5]	182.4	183.0	170.5	133.71	6.76	6.87	5.91	4.96
Annual Avg. 1977[5]	195.1	194.2	181.5	141.70	7.28	7.67	6.43	5.39
Annual Avg. 1978[5]	209.4	209.3	195.4	152.05	8.23	8.56	7.02	5.82
Annual Avg. 1979[5]	236.5	235.6	217.4	165.46	9.27	9.50	7.60	6.32
Annual Avg. 1980[5]	274.8	268.8	246.8	177.36	10.27	10.63	8.30	6.95
Annual Avg. 1981	—	—	272.4	193.71R	11.59	11.97	9.12	—
Apr 1981	303.5	293.4	266.8	—	11.30	11.63	8.94	7.51
May 1981	304.7	294.1	269.0	—	11.26	11.68	8.99	7.55
Jun 1981	305.1	294.5	271.3	191.06	11.31	11.88	9.07	7.60
Jul 1981	306.2	296.0	274.4	—	11.61	12.19	9.16	7.69
Aug 1981	307.2	296.2	276.5	—	11.85	12.09	9.19	7.76
Sep 1981	307.4R	295.7R	279.3	195.61	12.11	12.68	9.38	7.79
Oct 1981	309.0R	296.1R	279.9	—	12.09	12.43	9.37	7.84
Nov 1981	309.1P	295.5P	280.7	—	12.14	12.47	9.42	7.86
Dec 1981	310.1P	295.9P	281.5	200.10R	12.09R	12.44R	9.52R	7.93R
Jan 1982	311.7P	298.2P	282.5	—	12.24P	12.60P	9.67P	8.00P
Feb 1982	311.4P	298.5P	283.4	—	—	—	9.66P	8.03P

P = Preliminary R = Revised since last month

[1]US Bureau of Labor Statistics, Washington, D.C.; "Producer Prices and Price Indexes," Table 6 (formerly "Wholesale Prices and Price Indexes"). Producer Price Indexes are revised four months after they are first released to reflect the availability of late reports and corrections by respondents.

[2]US Bureau of Labor Statistics, Washington, D.C.; Consumer Price Index for All Urban Consumers, US City Average, All Items.

[3]US Department of Commerce, Washington, D.C.; Bureau of Economic Analysis, National Income and Wealth Division; "Survey of Current Business," Table A. The GNP Implicit Price Deflator is published quarterly, and seasonally adjusted.

[4]US Bureau of Labor Statistics, Washington, D.C.; "Employment and Earnings," Table C-2. All data based on 1972 revision of SIC Manual. Data for 1970-1976 are adjusted to the March 1977 benchmark. Data for 1977-1978 are adjusted to the March 1979 benchmark. Data for January 1979 and beyond are adjusted to the March 1980 benchmark.

[5]Monthly data 1970-1978 for Producer Price Index-Industrial Commodities, Consumer Price Index, and Employment and Earnings SIC codes 10, 333, and 28, and quarterly data for GNP Implicit Price Deflator appear on pages 4.6-4.8 of Nuexco Report 139.
Monthly data 1977-1978 for Employment and Earnings SIC Codes 10, 333, and 28 appear on page 33 of Nuexco Report 147.
Monthly data 1970-1978 for Employment and Earnings SIC Code 36 appear on page 23 of Nuexco Report 154.
Monthly data 1979-1980 for Employment and Earnings, Revised Establishment Data, all listed codes, appear on page 22 of Nuexco Report 158.
Monthly data 1977-1980 for Producer Price Index-All Commodities, appear on page 21 of Nuexco Report 158.

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FIGURES OF THE MONTH

	This Month	Last Month	12 Months Ago
	(Referenced to March 31, 1982)		
Exchange Value[1]	22.50	23.00	25.00
Transaction Value[1]	23.40	23.70	27.00
Conversion Value[2]	1.20	1.20	1.20
Loan Use Charge Rate[3]	6%	6%	7%
Near-Term Uranium Supply[4]	11.2	10.9	8.3
Near-Term Uranium Demand[5]	2.2	3.3	2.1
Near-Term Supply-Demand Ratio	5.2	3.3	4.0
Optimum Tails Assay[6]	.310	.307	.279
Current Transactions[7]:			
Number of Transactions	6	4	4
Quantity of Material[8]	0.6-1.4	1.3-2.5	4.7-8.5

[1]US $ per pound U_3O_8 equivalent
[2]US $ per pound U as UF_6
[3]Percent per annum
[4]Active inquiries to sell, for delivery within 12 months after contract signing (millions of pounds U_3O_8)
[5]Active inquiries to purchase, for delivery within 12 months after contract signing (millions of pounds U_3O_8)
[6]Percent U_{235}
[7]Uranium transactions only; does not include loans or conversion transactions
[8]Millions of pounds U_3O_8, equivalent

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STANDARD ABBREVIATIONS

ACTU:	Australian Council of Trade Unions
AEB:	Atomic Energy Board (South Africa)
AEC:	Atomic Energy Commission (US) (predecessor of NRC and DOE)
AECB:	Atomic Energy Control Board (Canada)
AFC:	Adjustable fixed commitment (swu contract)
AFR:	Away from reactor
AFUDC:	Allowance for Funds Used During Construction
AGR:	advanced gas-cooled reactor
BLWR:	same as BWR
BNFL:	British Nuclear Fuels, Ltd. (UK)
BWR:	boiling water reactor
CEA:	Commissariat a l'Energie Atomique (France)
CEGB:	Central Electricity Generating Board (UK)
CNEA:	Comision National de la Energia Atomica (Argentina)
COMINAK:	Compagnie des Mines d'Akouta (Republic of Niger)
DOE:	Department of Energy (US)
EEC:	European Economic Community
EIA:	Energy Information Agency (US)
EMR:	Department of Energy Mines & Resources (Canada)
ENEL:	Ente Nationale per l'Energie Elettrica
ENUSA:	Empresa Nacional del Uranio S.A. (Spain)
ERA:	Energy Resources of Australia
ESCOM:	Electricity Supply Commission (South Africa)
EdF:	Electricite de France
FBFC:	Societe Franco-Belge de Fabrications de Combustibles
FBR:	Fast breeder reactor
FRG:	Federal Republic of Germany
GCHWR:	gas-cooled heavy-water moderated reactor
GCR:	gas-cooled reactor
GNP:	Gross National Product
HTGR:	high-temperature gas-cooled reactor
HWLWR:	heavy water moderated boiling light-water-cooled reactor
IAEA:	International Atomic Energy Agency
INFCE:	International Nuclear Fuel Cycle Evaluation
JAURD:	Japan-Australia Uranium Resource Development Co.
JEN:	Junta de Energia Nuclear (Spain)
LGR:	light-water cooled graphite-moderated reactor
LMFBR:	liquid metal fast breeder reactor
LTFC:	Long-term fixed commitment (swu contract)
LWBR:	light-water breeder reactor
LWCHW:	light-water-cooled heavy-water-moderated reactor
MITI:	Ministry of International Trade and Industry (Japan)
MMN:	Metallurgie et Mecanique Nucleaires
MWe:	Megawatts of electricity
NAPOCOR:	National Power Corporation (Philippines)
NNPA:	Nuclear Non-proliferation Act (US)
NPT:	Treaty on Non-Proliferation of Nuclear Weapons
NRC:	Nuclear Regulatory Commission (US)
NSSS:	Nuclear Steam Supply System
NUFCOR:	Nuclear Fuels Corporation of South Africa Ltd.
OURD:	Overseas Uranium Resources Development Co., Ltd.
PHWR:	pressurized heavy-water-moderated and cooled reactor
PNC:	Power Reactor and Nuclear Fuel Development Corporation (Japan)
PSC:	Public Service Commission
PUC:	Public Utility Commission (US)
PWR:	pressurized water reactor
RAR:	Reasonably assured resources
RTZ:	Rio Tinto-Zinc Corporation Ltd. (UK)
SMDC:	Saskatchewan Mining Development Corporation (Canada)
SOMAIR:	Societe des Mines de l'Air
SSPB:	Swedish State Power Board
SWU:	Separative Work Unit
THTR:	thorium high-temperature reactor
TMI:	Three Mile Island (US)
TVA:	Tennessee Valley Authority (US)
UEGA:	Uranium Enrichment Group of Australia
UK:	United Kingdom
URDC:	Uranium Resources Development Corp. (Japan)
USBLS:	United States Bureau of Labor Statistics
VTAO:	Variable tails option (swu contract)
WOCA:	World outside communist areas

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NUEXCO REPORT 164
EXECUTIVE SUMMARY

Exchange Value Decreases 50 Cents to $22.50

The **Exchange Value** as of March 31, 1982 is $22.50 per pound U_3O_8. The decline of 50 cents from last month reflects the market response to the appearance of aggressive new sellers. As near-term supply has risen, sellers have demonstrated a willingness to cut prices to conclude transactions.

Near-Term Supply Increases

Additional sellers entered the spot and near-term markets during March, offering substantial amounts of material. *Active* sellers in the zero to one year time frame are offering 11.2 million pounds U_3O_8. *Active* uranium demand in the same period amounts to only 2.2 million pounds U_3O_8. The ratio of near-term supply to near-term demand for uranium is 5.2:1 as of March 31, 1982. Material offered for sale by utility inventory holders accounts for **95 percent** of the spot and near-term uranium supply available from *active* sellers. Material being sought by parties not primary users represents 70 percent of the spot and near-term demand for uranium by *active* buyers.

Transaction Value Decreases Thirty Cents to $23.40

The **Transaction Value** as of March 31, 1982 is $23.40 per pound U_3O_8. It includes twelve transactions totaling 2.8 million pounds U_3O_8 and covers a period of three months.

Six Uranium Sales Reported

Six uranium sales are reported. They include 0.6 million to 1.4 million pounds U_3O_8. All six involved US sellers; all six called for delivery this year. Four buyers were US and two were European.

Conversion Value Steady at $1.20

One conversion transaction is reported. It is likely that substantial additional conversion will soon become available in the secondary market.

Market Data Format Revised

The listings of uranium and conversion supply and demand appearing in the *Market Data* section have been revised to differentiate between *active* and *inactive* situations.

Australia's Jabiluka Project Gets Marketing Approval

Pancontinental, 65% owner of Jabiluka, reached agreement with the Northern Land Council on production royalties for the Jabiluka project. A scant three weeks later, the government gave Pancontinental permission to begin marketing efforts.

Production Forecast Revised

Nuexco's latest forecast of uranium production shows the world total declining slightly throughout the next ten years. Sharp declines in US production will be offset by increases in Canada and Australia.

Consumption Forecast Revised

Nuexco's latest forecast calls for European consumption of uranium to exceed US consumption in 1982 by 15%. That margin is forecast to increase to 20% by 1991.

Supply-Demand Balance Revised

Nuexco's latest forecast calls for worldwide uranium inventories to rise steadily from the current level of 5.5 years' forward consumption to 6.5 years' forward consumption in 1991. Annual US production shortfalls, beginning in 1983, will be offset by inventory depletion and increased imports. In the rest of the world, supply and demand will be balanced by inventory accumulation and increased exports, rather than by reducing production.

Cluff Lake Project Discussed

The *Raw Materials* section focuses on the development of Canada's Cluff Lake project, owned by Amok Ltd. and SMDC.

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